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ABSTRACT

A modified Delphi technique was used to identify the factors that positively influence technology education teachers' decision to enroll in graduate education programs and the barriers to their enrollment in advanced degree programs. Two pairs of Delphi panels were established. The doctoral panels consisted of 15 recent doctoral graduates and 30 practicing technology education teachers with master's degrees. The master's degree panels consisted of 19 technology education teachers with master's degrees and 18 technology education teachers with no advanced degree. The three panels whose members had advanced degrees all rated their personal goal and desire as the top influence for pursuing a graduate degree, whereas the technology education teachers who did not hold master's degrees rated their personal goal and desire significantly lower. The university's geographical location, program quality and reputation, and faculty quality and reputation were all rated as positive influences by three panels. All four panels considered time commitment a substantial barrier to enrollment in a graduate-level program. Universities providing graduate technology education programs focusing on teacher education were advised to promote the quality of the university, the program, and its faculty and to capitalize on technology education teachers' personal goals and desires to recruit qualified individuals into graduate education programs. (Contains 10 references.) (MN)

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Technology Education Graduate Education:

Factors Influencing Participation

A Research Paper

Presented for the

Council for Technology Teacher Education

at the

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During the past two decades, higher education has initiated a variety of educational reforms in an attempt to improve the effectiveness of teacher education. One major focus of the reform movement has been professionalization of schools that prepare educators. Metcalf-Turner and Fischetti (1996) indicated that traditional higher education approaches to teacher education were inadequate primarily because of disengagement between theory and practice. The need for context-rich educational experiences in teacher preparation is important in all teacher education, but is imperative in the field of technology education. Technology education demands a co-mingling of theory and principles with practice. Morris, Armstrong, and Price (1997) stated that the present teacher education system fails to equip pre-service teachers for the realities of the classrooms they will enter. The challenge for technology teacher educators is to embrace reform initiatives that bridge pedagogy by encouraging the profession's best teachers to enter the teacher education faculty ranks, thus keeping technology teacher education theory current with classroom practice.

However, graduate-level technology teacher education has not kept pace with the need for qualified faculty. The number of individuals pursuing graduate studies in technology education, focusing on teacher education, is at an all-time low (Bell, 2001). The technology teacher education profession is in short supply of qualified faculty, as well as leadership for the profession who have earned graduate degrees. Coupled with the fact that the nation's secondary schools have a significant shortage of technology education teachers, the number of undergraduate technology teacher education majors has also declined. Based on these trends, Volk (1997) predicted that "the demise of technology teacher preparation programs will occur around the year 2005" (p. 69).

Statement of the Problem

Since 1975, there has been a steady decrease in the number of technology teacher education graduates (Volk, 1997). This decrease has been compounded by a significant increase in the number of technology education teachers needed across the nation (Weston, 1997). A survey of leaders in the field of technology education rated insufficient quantities of technology education teachers and the elimination of technology teacher education programs at the university level as two of the critical issues facing the profession (Wicklein, 1995).

Volk (1997) noted that one factor in the decline of university technology teacher education programs has been the lack of graduate-level prepared faculty to serve as technology teacher education faculty. Buffer (1979) found that between 1955 and 1977 over 2,500 individuals received a doctoral degree with emphasis in industrial education, the predecessor of technology education. A survey of the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, 1999, & 2000) noted there were only 146 technology education doctoral degrees awarded between 1994 and 2000. A survey of the 2000-2001 graduates noted only 16 technology education doctorates for that period (Bell, 2001). Buffer further noted that there were 2,507 master's degrees awarded during the 1976-1977 academic year. This number pales in comparison the 6,700 master's degrees awarded in 1938 (Buffer). Furthermore, an examination of the *Industrial Teacher Education Directory* indicated that only 222 master's degrees were earned in 2000.

Currently, there is a lack of information as to the causes in the decline in technology educators pursuing an advanced degree. Without increasing the number of graduate degrees in technology teacher education, the baccalaureate degree major of technology education may vanish and, consequently, technology education courses would no longer be provided to the

nation's middle school and high school students. This research was an attempt to address one of the major problems facing the technology education profession: the lack of graduate prepared teacher education faculty.

Significance of the Problem

According to the International Technology Education Association (2000), technology education teachers prepare the nation's middle school and high school students with core technological knowledge and skills. Secondary technology education is a hands-on program of study that provides an opportunity for students to learn about communication, construction, design, manufacturing, power-energy, and transportation. Technological literacy benefits students who choose technical careers, such as engineering, architecture, manufacturing, and construction, as well as students from all fields. Theoretically, a shortage of secondary technology education teachers could have an impact on the quality and quantity of students entering university engineering and technology programs.

The number of technology teacher education graduates from the nation's universities has reached a critical stage. As Volk (1997) noted, "if we do not address the issues, soon we will be going … going … gone" (p. 70). Volk further stated that "the corresponding decrease in doctoral degrees granted and diminished new professional opportunities in technology education teacher preparation programs does not afford the incentive or opportunity for new ideas to be promoted" (p. 69).

Purpose of the Study

The purpose of this research was to identify the factors that positively influence technology education teachers to enroll in graduate education programs and also to identify the barriers that hinder these teachers' entering doctoral or master's degree programs. Both technology education graduate education program graduates and technology education teachers assisted in identifying these factors. The following research questions were developed for examination.

1. What factors do graduate education program graduates identify as providing the greatest positive influence for their enrollment into a graduate program?
2. What factors do technology education teachers indicate would provide the greatest incentive to enroll in a graduate education program?
3. What factors do graduate education program graduates identify that provided the strongest barriers to their enrollment in a graduate program?
4. What factors do technology education teachers identify as providing the strongest barriers to their enrollment in a graduate education program?

Methodology

This study utilized a modified Delphi technique as noted by Paige, Dugger, and Wolansky (1996) and Wicklien (1995) to identify and analyze what factors lead individuals to enter both doctoral programs and master's degree programs focusing on technology teacher education. Additionally, the factors that hinder individuals from entering doctoral and master's programs were identified.

Population

Two pairs of Delphi panels were established, one pair for examination of the doctoral programs and the other pair of panels to study the master's degree programs. The first doctoral group consisted of recent doctoral graduates (1994 -1999) whose degrees were in technology education focusing on teacher education as indicated in the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, & 1999). The *Directory* noted that 127 doctoral degrees were granted during this five-year timeframe. Institutions that had graduated five or more doctorates during the five-year time span were contacted and asked to provide the names and address of their technology education doctoral graduates. This resulted in a population of 15 doctoral graduates whose location could be identified. These 15 individuals comprised the population for one panel of this modified Delphi study. From this population, nine doctoral graduates served on the Delphi panel.

The second doctoral panel consisted of practicing technology education teachers. Technology education directors from six states were asked to identify five technology education teachers who currently hold a master's degree and whom the director would categorize as "an outstanding candidate for doctoral studies." This second doctoral population consisted of 30 technology education teachers having earned a master's degree and identified by their state director as a leader in the profession. The panel used in this study consisted of 16 teachers from this population.

The first master's degree panel consisted of 19 technology education teachers who had earned a master's degree from 1994 through 1999. This panel was randomly drawn from an identified population of 209 technology education teachers who had earned a master's degree.

The second master's degree panel of 18 teachers was randomly selected from an identified population of 213 technology education teachers.

Procedure

The first round of this modified Delphi study consisted of an open-ended survey mailed to all participants, doctoral graduates, master's degree graduates, and both sets of technology education teachers. Doctoral and master's degree graduates were asked to identify the factors that positively influenced their decision to enter and complete a graduate education program, and to list those barriers that they were able to overcome in order to earn an advanced degree. Technology education teachers were asked to list the factors that would positively influence them to enter either a doctoral program or a master's degree program. These two pairs of panels were also asked to identify the barriers that have hindered them from entering either a doctoral program or a master's degree program.

First round responses were then categorized into similar factor groupings for the second round review. Each panel's listings, doctoral graduates, master's degree graduates, and both sets of technology education teachers, were grouped into 10 common factors for both positive influences and barriers. Each Delphi panel was then mailed a set of second round instruments on which they were asked to rank-order the 10 factors from one (1 = greatest) to 10 (10 = weakest). Each participant received two ranking surveys, one noting positive influences and the other instrument listing barriers. The findings from the study's second rounds were then compiled for a third Delphi round. Top rank-ordered items were selected to be used as the factors listed in the study's final round.

During the third and final Delphi round, participants were asked to rate each positive influence and each barrier on a one-to-five Likert-type scale. One indicating a very weak

influence, and five noting a very strong influence with three noting the absence of influence. Data from the third round surveys were then analyzed for statistical significance using the t-test treatment.

Findings

Master's degree graduates rated their personal goal and desire as the top influence for pursuing a graduate degree (M = 4.74, SD = 0.56) (see Table 1). While technology education teachers rated their personal goal and desire at a significantly lower (M = 4.00, SD = 1.14, p = .0162). Doctoral graduates also rated their personal goals and desire as the top positive influence in enrolling and completing a doctoral program in technology education (M = 4.63, SD = 0.70) (see Table 2). Technology education teachers from the doctoral Delphi panel, who had completed a master's degree, also noted that their personal goals and desire would provide them the most positive influence for entering a doctoral program (M = 4.63, SD = 0.78).

The university's geographical location was indicted as a positive influence by both master's degree graduates (M = 4.37, SD = 0.68) and their cohort technology education teachers (M = 4.28, SD = 1.02). The positive influence of the university's location was also noted by the teachers with a master's degree from the doctoral panel (M = 4.25, SD = 1.09). However, this positive influence of geographical location was not shared by doctoral graduates (M = 2.38, SD = 1.58) and tested significant (p = .0019) for the doctoral panel. The significant difference in doctoral panel members with regard to the university's geographical location was also noted in the barriers section by the master's degree Delphi panelists (see Table 3). Teachers rated the university's location as a significant barrier to enrolling in a master's degree program when

compared to their master's degree graduate counterparts (M = 3.50, SD = 1.58, M = 2.16, SD = 1.30, p = .0007).

Doctoral graduates rated the doctoral program's quality and reputation along with its faculty's quality and reputation as positive influences (M = 4.00, SD = 0.71; M = 4.00, SD = 0.87). Technology education teachers, from the doctoral panel, rated the quality and reputation of the program and faculty lower, (M = 3.63, SD = 0.70; M = 3.56, SD = 1.06). Technology education teachers without a master's degree rated the quality and reputation of the university as their strongest positive influence (M = 4.56, SD = 0.51) while the master's degree graduates from this panel rated that item significantly lower (M = 3.84, SD = 1.01, p = .0085).

Both groups from the doctoral Delphi panel indicated that time commitment was a substantial barrier that hindered their enrollment into a doctoral program (M = 4.00, SD = 1.12; M = 4.38, SD = 0.86) (see Table 4). Both groups of technology education teachers, from the master's degree panel also ranked time commitment as a barrier (M = 3.58, SD = 1.35, M = 3.28, SD = 1.32). Program residency requirements and a lack of quality programs did not appear to provide barriers to either pair of panels.

Implications

The data provided by the two pairs of panels from this modified Delphi study indicated that universities that provide graduate education programs in technology education focusing on teacher education should implement the following strategies.

1. Promote the quality of the university, the program, and its faculty.
2. Capitalize on technology education teachers' personal goals and desires to recruit qualified individuals into graduate education programs.

Conclusion

As noted by Paige, Dugger, and Wolansky (1996) "doctoral-granting institutions must provide the leadership. This leadership must come in the form of providing programs that have a research focus directed toward contributing to the body of knowledge and that are aimed at developing and providing future leaders with the background and experiences that are needed to move the profession forward into the 21st century" (p. 20). If the universities do not increase their production of advanced degrees in technology education focusing on teacher education, Volk's doomsday prediction will be reality.

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Table 1

Positive Influences for Enrolling in a Master's Program

	Master's Graduates		TE Teachers			
Factor	M	SD	M	SD	t	p
Personal goal/desire	4.74	0.56	4.00	1.14	2.5272	.0162
University's geographical location	4.37	0.68	4.28	1.02	.3174	.7528
Pay increase	4.05	1.27	4.22	0.73	.4954	.6234
Quality and reputation of university	3.84	1.01	4.56	0.51	2.7885	.0085
Financial support/assistantships	2.26	1.59	3.17	1.65	1.7084	.0964
	n=19		n=18			

Table 2

Positive Influences for Enrolling in a Doctoral Program

	Doctoral Graduates		TE Teachers			
Factor	M	SD	M	SD	t	p
Personal goal/desire	4.63	0.70	4.63	0.78	0.000	1.000
Financial support/assistantships	4.13	0.93	4.44	0.70	.9446	.3547
Quality and reputation of university	4.00	0.71	3.63	.070	1.2623	.2195
Quality and reputation of the faculty	4.00	0.87	3.56	1.06	1.0581	.3010
Support of advisor/faculty	4.00	0.87	3.81	0.73	.5835	.5653
Support of family	4.00	1.22	4.38	0.60	1.0513	.3040
Direct communication with advisor	3.88	1.05	3.81	0.81	.1865	.8537
Flexibility of the program	3.25	0.97	4.50	0.71	3.7039	.0012
Interest in research	3.13	1.62	3.13	0.99	0.000	1.000
Credit for prior coursework	2.63	1.58	4.63	0.70	4.4041	.0002
Short residency period	2.38	0.99	4.50	0.71	6.2175	.0001
University's geographic location	2.38	1.58	4.25	1.09	3.5012	.0019
Distance education offerings	1.63	0.99	4.25	1.20	5.5578	.0001
	n=9		n=16			

Table 3

Barriers to Enrollment in a Master's Program

Factor	Master's Graduates M	Master's Graduates SD	TE Teachers M	TE Teachers SD	t	p
Time commitment	3.58	1.35	3.28	1.32	.6829	.4991
Financial	3.37	1.26	3.17	1.47	.4451	.6590
Lack of flexibility in the program	3.11	1.20	3.78	1.00	1.8395	.0743
Lack of quality master's program	2.83	1.15	3.56	1.42	1.7228	.0937
University's geographic location	2.16	1.30	3.50	1.58	2.8236	.0007
	n=19		n=18			

Table 4

Barriers to Enrollment in a Doctoral Program

	Doctoral Graduates		TE Teachers			
Factor	M	SD	M	SD	t	p
Time commitment	4.00	1.12	4.38	0.86	.9515	.3512
Financial	3.75	0.97	3.81	0.88	.1578	.8760
Family responsibilities	3.50	1.22	4.38	0.70	2.3081	.0303
Lack of flexibility in the program	3.38	1.73	3.44	1.41	.0942	.9258
Geographic location of university	3.00	1.22	3.88	1.50	1.4990	.1475
Lack of quality doctoral programs	2.88	1.36	3.88	1.96	1.3525	.1894
Program's residency requirement	2.75	1.09	3.69	1.45	1.6888	.1048
	n=9		n=16			